

Branch – STATISTICS

SAMPLING THEORY AND METHODS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Stratified sampling comes under the category of (i) unrestricted sampling (ii) subjective sampling (iii) purposive sampling (iv) restricted sampling	K1	CO1
	2	Which of the following statements does not hold good in case of stratified sampling? (i) stratified sampling is convenient (ii) stratified sampling is always good (iii) enables to gather information about different stratum separately (iv) reduces error for fixed cost	K1	CO1
2	3	Systematic sampling means (i) selection of n contiguous units (ii) selection of n units situated at equal (iii) selection n largest units (iv) selection of n middle units in a sequence	K1	CO2
	4	Selected units of a systematics sample are (i) not easily locatable (ii) easily locatable (iii) not in whole population (iv) all the above	K1	CO2
3	5	A population is divided into clusters and it has been found that all items within a cluster are alike. Which of the following sampling procedures would you adopt? (i) simple random sampling (ii) cluster sampling (iii) systematics sampling (iv) stratified sampling	K1	CO3
	6	Supposing that, in cluster sampling s_w^2 represents the variance within the clusters and s_b^2 between clusters. what is the relation between s_b^2 and s_w^2 ? (i) $s_w^2 = s_b^2$ (ii) $s_w^2 \geq s_b^2$ (iii) $s_w^2 \leq s_b^2$ (iv) $s_w^2 \neq s_b^2$	K2	CO3
4	7	Two stage sampling design is more efficient than single stage sampling if the correlation between units in the first stage is (i) negative (ii) positive (iii) zero (iv) none of the above	K1	CO4
	8	Double sampling is also known as (i) two-stage sampling (ii) two-phase sampling (iii) two-directional sampling (iv) all the above	K2	CO4
5	9	If the mean of the sampling distribution is equal to the parameters then estimators will be (i) biased (ii) consistent (iii) sufficient (iv) unbiased	K1	CO5
	10	To find sample size we must have estimate of (i) mean (ii) variance (iii) frequency (iv) none of the above	K2	CO5

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Module No.	Question No.	Question	K Level	CO
1	11.a.	If $\bar{y}_{st}$ is an unbiased estimator of the population mean $\bar{Y}_N$, then prove that $E(\bar{y}_{st}) = \bar{Y}_N$.	K5	CO1
		(OR)		
	11.b.	Explain the advantages of stratified random sampling with illustration.		
2	12.a.	Prove that the variance of systematic sampling $Var(\bar{y}_{sys}) = \frac{(k-1)}{nk} S_{wst}^2 [1 + (n-1)P_{wst}]$.	K5	CO2
		(OR)		
	12.b.	Obtain the relative efficiency of systematic sampling when compared to simple random sampling.		
3	13.a.	Prove that mean and variance of cluster sampling method.	K5	CO3
		(OR)		
	13.b.	Estimate the mean and variance of unequal cluster sampling method.		
4	14.a.	Estimate the mean and variance of two stage sampling with unequal first stage units.	K5	CO4
		(OR)		
	14.b.	Explain three stage probability proportional size sampling method with an example.		
5	15.a.	Distinguish between ratio and regression estimator with mean per unit.	K2	CO5
		(OR)		
	15.b.	Estimate the variance of difference estimator.		

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Prove that the inequality $V_{opt}(\bar{Y}) \leq V_{prop}(\bar{Y}) \leq V_{ran}(\bar{Y})$.	K5	CO1
2	17	If the population consists of a systematic liner trend, $Y_i = i; i = 1, 2, \dots, k$ then prove that $V(\bar{y}_{st}) \leq V(\bar{y}_{sys}) \leq V(\bar{y}_n)_R$.	K6	CO2
3	18	State Hurwitz – Thompson estimator and derive the variance.	K5	CO3
4	19	Explain the two stage sampling methods with equal number of second stage units.	K2	CO4
5	20	Prove that the variance of ratio estimator in simple random sampling without replacement technique.	K5	CO5

Z-Z-Z

END